

Optimized Magnetic Nozzles for MPD Thrusters, Phase I

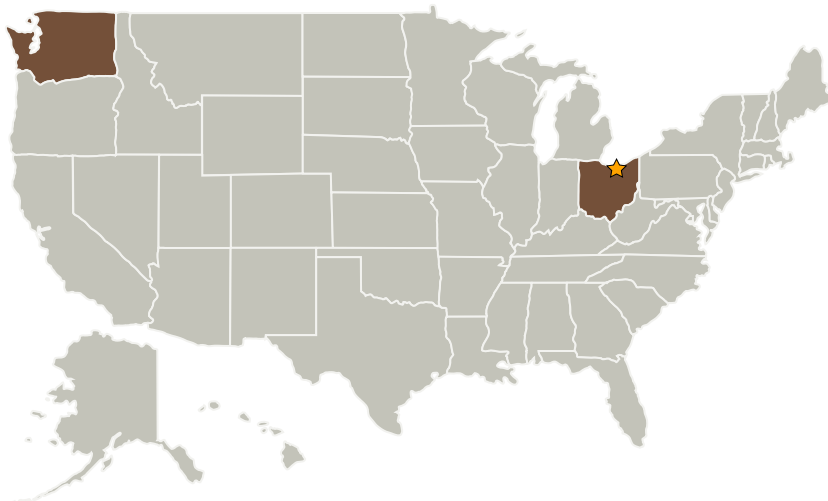
Completed Technology Project (2005 - 2005)



Project Introduction

Magnetoplasmadynamic (MPD) thrusters can provide the high-specific impulse, high-power propulsion required to enable ambitious human and robotic exploration missions to the Moon, Mars, and outer planets. Whereas the thrust and power densities of Hall and Ion thrusters are limited by space charge effects, MPD thrusters can process very high power levels while providing high specific impulse thrust. MPD thrusters, however, have traditionally been plagued by poor thrust efficiencies. These inefficiencies are due primarily to power lost into the anode caused by the Hall effect. TUI proposes to apply innovative techniques for using applied magnetic nozzles to eliminate these anode power losses and dramatically improve the performance of MPD thrusters. In the proposed Phase I effort, TUI will develop magnetic nozzle designs optimized to maximize the thrust efficiency of MPD thruster systems, minimizing anode fall power losses and maximizing the efficiency of plasma detachment from the magnetic nozzle. In the Phase II effort, we will build and test prototypes of these magnetic nozzles, and obtain definitive measurements of their enhancement of MPD thruster efficiencies.

Primary U.S. Work Locations and Key Partners



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Organizational
Responsibility**Responsible Mission
Directorate:**

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Tethers Unlimited Inc	Supporting Organization	Industry	

Primary U.S. Work Locations	
Ohio	Washington

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert M Hoyt

Technology Areas

Primary:

- TX01 Propulsion Systems
 - └ TX01.2 Electric Space Propulsion
 - └ TX01.2.2 Electrostatic